

APPENDIX G

UNITED STATES GEOLOGICAL SURVEY HURRICANE RESPONSE PLAN

I. OFFICE ORGANIZATION

A. Office Responsibilities

1. District Chief

- a. Hurricane event attendance policy - In the event of a hurricane moving in the general vicinity of the office, the District Chief should set a policy for attendance. In general, employees should report to work when the threat of the hurricane has passed and personal circumstances permit. The attendance policy and any other plans should be announced at a general meeting prior to the storm.
- b. Survey contacts - Apprise Region and Area staff as to conditions in the District.
- c. Cooperators - Make contact with the Federal Emergency Management Agency to initialize a storm-surge study. Make other cooperator contacts as necessary.

2. Administrative Officer

- a. Office status - Check on physical structure, electricity, and phone service at office. Start repair procedures in motion. If a mobile phone is available, the phone number should be distributed to employees prior to the storm event. If there is a power outage, the office phones will not work, even though phone service is still functioning. The mobile phone could be used for employees to contact the office, and vice-versa. Also, generators could be used to power some essential equipment or lights.
- b. Personnel - Attempt to determine status of employees and notify employees as to office status and attendance policy.

3. Data Section Chief

- a. Monitor network - Determine status of satellite link and data collection platforms. Determine status of other gaging stations in affected area.
- b. Flood measurement - Determine if flooding has occurred and oversee the organization of field crews and technicians to make flood measurements on streams impacted by heavy precipitation if needed.

4. Studies Section Chief

- a. Storm surge - Organize studies section personnel for the collection of high-water marks in the impacted area. Assign someone the duty of project chief and authorize to direct other personnel as needed.

- b. Survey contacts - Determine the need for additional personnel and make appropriate contacts to temporarily obtain personnel from other Districts.
 - c. Other contacts - Notify appropriate agencies as per the decisions of the OFCM Post-Storm Data Acquisitions Working Group.
5. All Other Employees - All employees are responsible for conforming to the predetermined attendance policy. In general, employees are required to report to work when the threat of the hurricane has passed and personal circumstances permit.

II. STORM-SURGE DOCUMENTATION

A. Advance Planning

1. Maps - Several sets of quad maps of coastal areas could be obtained and kept on hand in case of a hurricane event.
2. Transects - Coastal transects can be defined prior to a hurricane event.
3. Bench marks - Information for bench marks located in coastal counties can be obtained prior to the hurricane event. Sources include the National Geodetic Survey and county engineers.
4. Other agencies - Information about other agencies that would be involved in a hurricane event could be compiled prior to a hurricane event. This would include local agencies such as levee districts and county engineers.

B. Equipment

1. Transportation and lodging - At least one vehicle is needed for each field crew. Personnel on loan from neighboring Districts should be encouraged to bring a vehicle if needed. Boats may be needed to reach remote areas. Lodging in the impacted area may be difficult to obtain due to the influx of insurance adjusters, utility repairmen, etc. Reservations for a lodging as close as possible to the impacted area should be made immediately after the storm.
2. Maps, transects, and bench marks - Each field crew should be given a set of quad maps for their assigned area. If available, maps and information about bench marks in their area should also be given to each crew.
3. Surveying equipment - Each field crew should have at least one field notebook, level, tripod, rod, 50-ft. steel tape, and folding engineers rule for surveying. They should also have an adequate supply of spray paint, chalk, magic markers, flagging, stakes, nails, cold chisel, and a hammer for flagging and surveying the high-water marks. A carpenter's level is also handy for carrying marks around corners.
4. Cameras - Each field crew should have a camera. Disposable cameras work well, but each photograph should be documented in the field book. Polaroid cameras, that give you the photo on the spot, also work well because you can put information directly on the photo. However, getting reprints of these can be costly.

5. Mobile phones - Mobile phones can be useful to field crews. The field crews need to make daily contact with the project chief, at least in the initial stages of the investigation, and the impacted areas have often lost phone services.
6. Global Positioning Systems - The portable "Pathfinder" units work extremely well for documenting high-water mark locations. Elevation measurements made using the larger GPS systems may not produce the level of accuracy required for the study.
7. Other - Field crews may need rubber boots, rain gear, insect repellent, shovels, and machetes. In addition, field crews may need documents or permits from appropriate agencies authorizing passage through road blocks into stricken areas.

C. High-water Mark Data Collection

1. Project Chief

- a. Assignment of duties - The project chief is responsible for the assignment of areas or transacts to the field crews and the designation of a leader for each crew. The project chief is also responsible for providing the field crews with bench-mark information and necessary maps.
- b. Data checks - The project chief is responsible for collecting and checking field data from the crews as it becomes available. Make copies of field notes as they become available. Transfer data from field maps to a master set and check for completeness of coverage and cohesiveness of adjacent high-water mark elevations. The project chief is also responsible for collecting all field notebooks, maps, and film at the end of the surveying phase of the project.
- c. Field perspective - The project chief should spend most of his time in the field collecting data so that he becomes completely familiar with the situation, and can be in constant contact with the other field crews.
- d. Local agencies - The project chief should meet with local, State, and federal agencies with common interests in storm-surge documentation and compare notes and ideas.

2. Field crews

- a. Equipment - Field crews should be responsible for obtaining and maintaining the necessary vehicles and equipment.
- b. Lodging - Field crews should make the necessary lodging arrangements as soon as possible after they receive their assignments.
- c. Documentation - Each crew is responsible for the full and complete documentation of the storm-surge in their assigned area.

3. Flagging high-water marks

- a. Locating marks - Talking to locals in the area is the best way to find out about the storm-surge in an area. Stop and ask when you see someone outside of their house or business. Once you've identified one high-water mark it is not too difficult to track it along the transect. Try to locate a mark every mile inland along the transect until the marks end. The best marks are found inside closed structures, or other places that are sheltered from wave action. Always try to find other marks nearby that will corroborate with the one you found.
 - b. Documenting marks
 - (1) Location - Note the mark's location on the map and in the field notes. Identify the transect, quad map, street address, and latitude and longitude, if available, in the field notes. Notes should be taken of the location of the mark in or on the structure, and a sketch should be made. Detailed descriptions should be made so that another person could find the mark using the notes. An identifying mark should be made with chalk, magic marker, paint, flagging, etc. in case the actual mark is destroyed by cleaning or rain. The mark should also be assigned a number which is noted at the site, in the notes, and on the map. Preliminary measurements from the floor or ground to the mark should be made using a steel tape or engineer's rule.
 - (2) Classification - The mark should be classified by line type, such as debris, seed, stain, wash, drift, etc. The quality of the line should also be noted: Excellent, Good +/- 0.1 ft., Fair +/- 0.25 ft., Poor > 0.25 ft. The notes should also indicate whether the mark is inside or outside of a structure.
 - (3) Photographs - At least one photo should be taken of each high-water mark. Because the lines defining high-water marks can often be faint, the line should be pointed to or otherwise marked for ease in identification in the photo. A photo of the structure should also be taken to facilitate finding it again at a later date. Keep a log of photos taken.
 - (4) Other - For each high-water mark, identify the members of the flagging crew, the day, and the time of day.
4. Surveying high-water marks
- a. Peg test - Conduct a 2-peg test once a week. Note the serial number of the level, the type of rod used, the persons conducting the test, and the date.
 - b. Survey procedures - Run a survey loop from a bench mark to each high-water mark using standard surveying rules for accuracy. Make at least one ground shot for a representative ground elevation and one water-surface shot for a representative water-surface elevation (if possible). Also survey the tops of levees or roads and ground surfaces on each side. Note the bench-mark identification, high-water mark number, transect, surveying crew, date, and time of day. Keep standard surveying notes.
 - c. Sketches - Make a detailed sketch or sketches showing location of bench mark, high-water mark, and approximate surveying route.

- d. Maps - Transfer the high-water mark elevations to maps and note similarity to elevations of nearby marks. If elevations differ significantly, try to find out why.

III. WATER QUALITY DATA COLLECTION

- A. Manpower - The District QW specialist is responsible for organizing the collection of water quality data from areas impacted by the storm. Crews should be made up of two persons each, one to drive the boat, and another to collect samples and conduct measurements. The number of crews used will depend on the size of the impacted area, the sampling coverage desired, and funding.
- B. Equipment - Each crew will require a vehicle, boat, sample bottles, Hydrolab, maps, and field notebook. A camera should also be used to record significant effects of the storm, such as damaged trees and fishkills.
- C. Sampling Parameters - Dissolved oxygen and biochemical oxygen demand are the important parameters to measure immediately after the storm's passage, especially in wetlands. Nutrient information is also desirable to further document the effects of the storm. Chloride concentration, or specific conductance, are good indicators of the extent of salt-water intrusion into freshwater areas.
- D. Sampling frequency - The number of sites sampled is dependent on the availability of funds, the size of the area covered, and the level of coverage desired. The sites should be resampled at a rate sufficient to determine the storm's impact on water quality and the recovery of water quality to normal conditions. The resampling rate will often be higher during the first weeks after the storm, then slow down later as recovery rates are determined.